



## Katedra Robotyki i Mechatroniki



# GENETIC AND EVOLUTIONARY ALGORITHMS IN TECHNICS

**Temat: Simple GA in MATLAB**

**Aim of classes: Get familiar with simple GA and its implementation in Matlab**

**Knowledge: structure of GA and Matlab functions.**

Prowadzący: dr inż. Mariusz Gibiec

Termin: (Dzień  
i Godzina zajęć)

Imię i nazwisko:

Data:

Uwagi:

According to the GA schema (Fig.1) we are going to build elements of GA

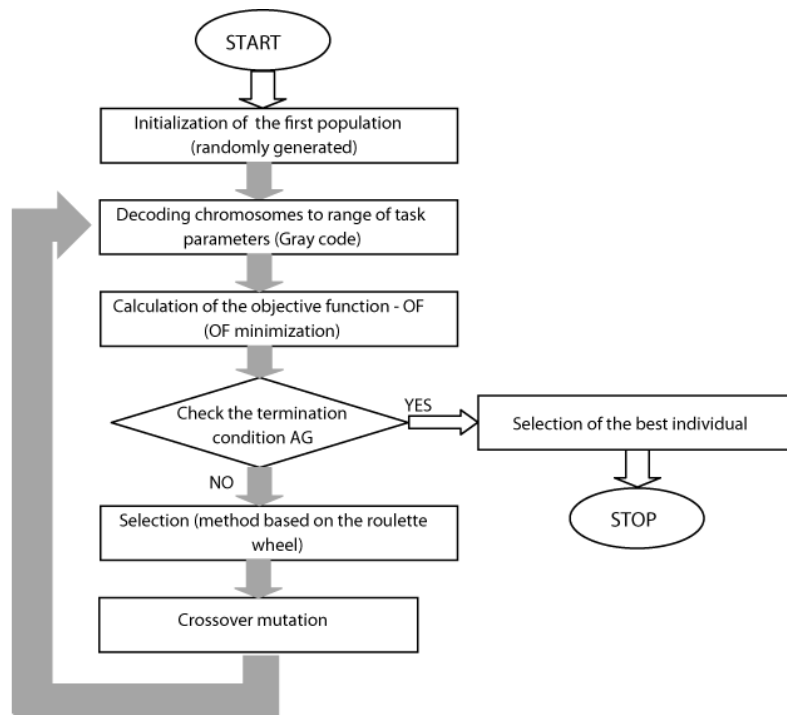


Fig.1 Schema of GA cycle

1. Define cost (fitness) function describing optimization problem e.g. MaxOnes problem, define its parameters to be optimized (number of, range of optimization)

```
% fitness function
```

2. Define parameters of coding

```
% number of parameters in each chromosome
% number of bits in each parameter
% total number of bits in a chromosome
```

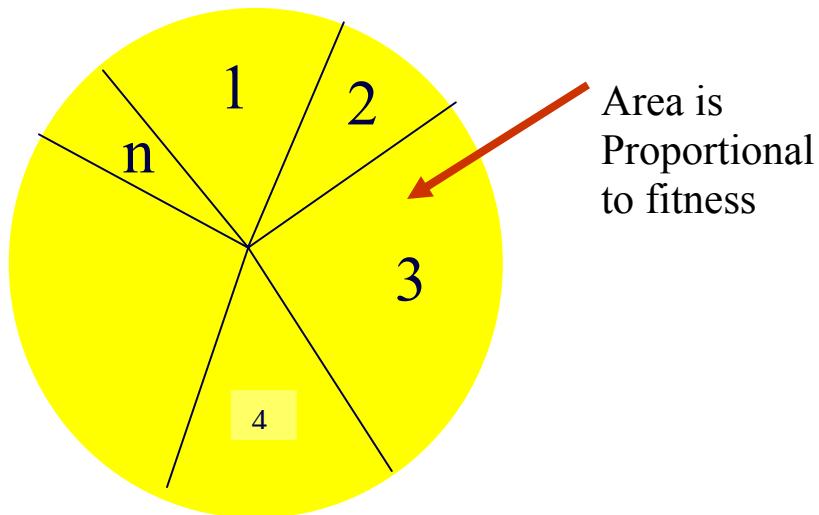
3. Initialize population of individuals

```
% set population size - must be odd
Create individuals
use rand and round functions
check the result
```

4. Evaluate the cost for population

```
use feval function
save result for every individual
Sort results
```

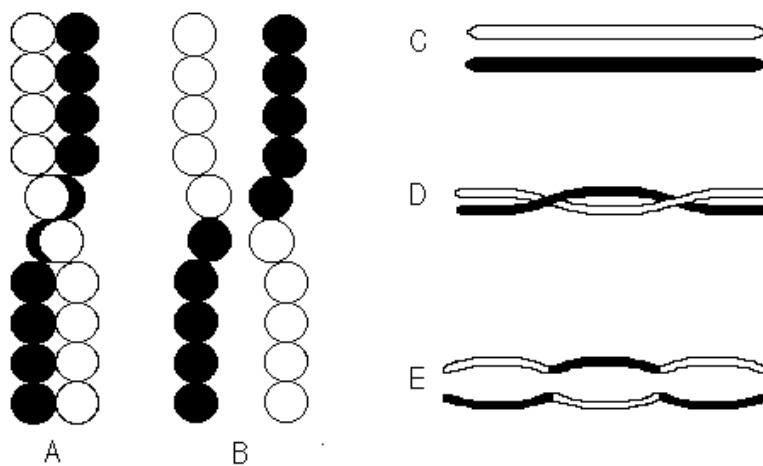
5. Select individuals for mating  
calculate probability of selection for each individual  
define roulette slots  
run roulette to select individuals



Roulette wheel

6. Crossing over  
 Select the crossing point (rand)  
 Perform crossing over to obtain new population

## Chromosome Crossing-over



7. Evaluate Evaluate the cost for the new population

8. Check the stopping criteria  
 % maximum number of iterations (for stopping criteria)  
 % maximum allowable cost (for stopping criteria)

Go to no. 5

Perform the GA for little no of individuals, observe results for following populations.

REPORT

Present results in row numbers and plots of population fitness changes during evolution of individuals.